PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : B63C 9/22 — A1

(11) International Publication Number: WO 95/35233

(43) International Publication Date: 28 December 1995 (28.12.95)

(21) International Application Number: PCT/DK95/00222

(22) International Filing Date: 7 June 1995 (07.06.95)

(30) Priority Data:
0714/94 17 June 1994 (17.06.94) DK

(71) Applicant *(for all designated States except US)*: VIKING LIFE-SAVING EQUIPMENT A/S [DK/DK]; P.O. Box 3060, DK-6710 Esbjerg (DK).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: ANDERSEN, Ole [DK/DK]; Fasanhøjen 13, DK-6713 Tjæreborg (DK).

(74) Agent: HOLME, Edvard; Holme Patent A/S, Sankt Peders Stræde 41, DK-1453 København K (DK).

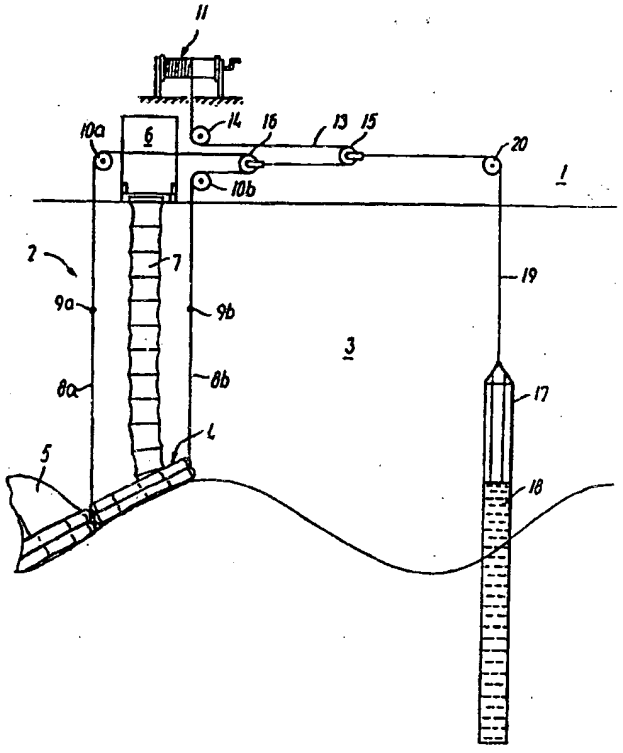
(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG).

Published
With international search report.
In English translation (filed in Danish).

(54) Title: A LIFE-SAVING EQUIPMENT

(57) Abstract

A life-saving equipment (2) is serving to evacuate and rescue persons onboard, for example, a sinking ship (1). The equipment comprises a floatable life-saving device, for example an inflatable platform (4), which can be launched at the ship's side and take up persons who are to be rescued. The equipment furthermore comprises an elongated bag (17) which is made of a flexible material, for example canvas or plastic, and which is connected to the platform (4) by means of a connecting-line (8a, b; 13 and 19) running around pulleys (10a, b; 14; 15; 16 and 20) on the ship. The bag (17) is open at the top and have at the bottom a non-return valve (27) which allows the water to get into but not out of the bag. In the initial phase of a rescue operation the equipment, with slack lines, is thrown into the sea where the platform (4) automatically inflates and at least the lower end of the bag (17) sinks into the water and is being filled with water. The platform is then hauled into the ship's side (3) by means of a winch (11) and at the same time the bag (17), now filled with water, is hoisted up along the ship's side. The bag will now function as a counterweight tautening the platform lines (8a and b) causing the platform constantly to be held securely against the ship's side, while the persons, who are to be rescued, skid down onto the platform (4) through a stocking-like chute (7). The bag is constructed with such dimensions that the size of the counterweight is sufficient for steadily holding the platform (4) securely against the ship's side without, however, being so great that the platform lines will be loaded to such an extent that they may risk to snap.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	**GB**	United Kingdom	**MR**	Mauritania
AU	Australia	**GE**	Georgia	**MW**	Malawi
BB	Barbados	**GN**	Guinea	**NE**	Niger
BE	Belgium	**GR**	Greece	**NL**	Netherlands
BF	Burkina Faso	**HU**	Hungary	**NO**	Norway
BG	Bulgaria	**IE**	Ireland	**NZ**	New Zealand
BJ	Benin	**IT**	Italy	**PL**	Poland
BR	Brazil	**JP**	Japan	**PT**	Portugal
BY	Belarus	**KE**	Kenya	**RO**	Romania
CA	Canada	**KG**	Kyrgystan	**RU**	Russian Federation
CF	Central African Republic	**KP**	Democratic People's Republic of Korea	**SD**	Sudan
CG	Congo			**SE**	Sweden
CH	Switzerland	**KR**	Republic of Korea	**SI**	Slovenia
CI	Côte d'Ivoire	**KZ**	Kazakhstan	**SK**	Slovakia
CM	Cameroon	**LI**	Liechtenstein	**SN**	Senegal
CN	China	**LK**	Sri Lanka	**TD**	Chad
CS	Czechoslovakia	**LU**	Luxembourg	**TG**	Togo
CZ	Czech Republic	**LV**	Latvia	**TJ**	Tajikistan
DE	Germany	**MC**	Monaco	**TT**	Trinidad and Tobago
DK	Denmark	**MD**	Republic of Moldova	**UA**	Ukraine
ES	Spain	**MG**	Madagascar	**US**	United States of America
FI	Finland	**ML**	Mali	**UZ**	Uzbekistan
FR	France	**MN**	Mongolia	**VN**	Viet Nam
GA	Gabon				

A life-saving equipment

The invention concerns a life-saving equipment for rescuing persons onboard a sinking ship, for example, and which comprises a floatable life-saving device, e.g. an inflatable platform for launching at the ship's side and taking up persons who are to be rescued.

The authorities in various countries have, for many years, issued demands, requiring a ship to carry a life-saving equipment necessary for, in emergency, being able to evacuate the persons onboard.

This life-saving equipment has traditionally comprised a number of lifeboats hanging in davits, for example, on the ship, and are lowered into the water when the boats are to be used for evacuation of persons from the ship.

As a supplement to and a partial replacement for this form of lifeboats, there hase frequently, over the last couple of decades, also been used inflatable rubber rafts, which are, during normal navigation, packed compactly in containers, thereby taking up much less space than the traditional lifeboats.

In an evacuation situation the containers with the rubber rafts are thrown overboard and, on the sea, the rafts are automatically inflated by means of a special inflation device belonging to each raft. Initially, the rafts are tethered to the ship by detachable lines that can be released so the rafts freely can sail and avoid being pulled underwater with the sinking ship.

The persons, who are to be rescued, can jump into the water from the sinking ship and then attempt to climb onto the rafts, but this operation is extremely dangerous, especially in heavy sea which often can be the direct cause of a shipwreck.

Systems have therefore been developed which enable those onboard to transfer to the life rafts directly from the ship itself. These systems usually comprise an inflatable platform and an inflatable chute or stocking-like hose, which from an evacuation cassette on the ship is led down to the inflated platform.

Persons to be rescued can now, on the top of the chute or through the hose, skid down onto the inflated platform from which they can board the inflated life rafts tethered along the sides of the platform.

During this part of the rescue operation it is of utmost importance that the platform is hold close against the ship's side in order thereby to avoid that the chute loses the connection with the inflatable chute or the stocking-like hose.

The platform is therefore tethered to the ship by lines which can be tautened by means of a winch and haul a platform, thrown overboard, into the ship's side and hold it in position there.

Usually, many persons can at the same time be standing on a platform which is therefore subject to a heavy load by the weight of the person upon it. Even if the platform is hold closely against the ship's side by the tautened lines, it still will, however, constantly move up and down concurrently with the passing of the waves.

It has turned out that these movements can be so violent in heavy sea that the tautened lines are overloaded and will snap when a platform, crowded with persons, sinks into a trough of the sea.

If one or more of the tautened lines snap, the platform will then no longer be under control and it can therefore capsize and/or have broken off the connection with the chute or hose, whereby the persons who should be rescued can end up in the rough sea at the risk of drowning.

From WO publication 94/01324 there is known an evacuation system having an inflatable platform and a stocking-like hose, through which persons to be evacuated can skid down onto the platform. In this case, there is a bottom frame which is lowered into the sea by means of a wire attached to a winch on the ship. This wire is simultaneously passed through eyelets or guides on the hose and the platform, whereby these are tethered in relation to the wire. The purpose of this construction is to hold the platform steadily against the ship's side by means of the wire, which is tautened by the weight of the bottom frame into a position as is intended to be a vertical position.

The stabilisation effect thereby obtained has, however, it's great limitations in heavy sea and rough weather, where the waves, the stream and the wind together still can manage frequently to throw the platform around in the water and drive it away from the ship's side. The arrangement has little or no effect on the vertical movements of the platform caused by the motion of the waves.

There will, therefore, be a demand for a life-saving equipment of the kind mentioned in the opening paragraph, which by means of one or more lines can secure a life-saving device, such as an inflatable platform, safely against the ship's side without any risk that the lines will snap, when the platform, e.g. in heavy seas, is exposed to great vertical movements up and down, caused by the motion of the waves.

The new and characteristic by which this is obtained consists in that the life-saving equipment comprises a counterweight for at a distance from the life-saving device to be hanged out over the ship's side, and a line-connection extending between the life-saving device and the counterweight and which is led over at least one guide, e.g. a pulley on the ship, whereby the pull in the lines always can be held safely below the breaking point. This is due to the fact that the pull now, via the line-connection, is transferred to the counterweight, the size of which therefore sets the limit to how great a pull can arise in the lines.

The counterweight can have the form of one great solid weight having a predetermined weight as must be, of necessity, rather great in order to be able to counterbalance the weight of common life-saving devices such as evacuation platforms. Depending on the size and the capacity of these devices, the weight can sometimes attain several tons. However, it is not very expedient to carry such large weights occupying useful space on-board and reducing the bulk of cargo which the ship otherwise could carry.

By a particularly advantageous construction of the counterweight, this consists, according to the invention, of a bag of water to be taken in when the bag is wholly or partly submerged into the sea. The bag can be made of a flexible material allowing the bag to be compactly packed and stored during normal navigation where the bag then is taking up very little space. The net weight of the bag is furthermore in itself extremely modest, and the ship is not subject to any noticeable disadvantages by having to carry one or more of these such very light and spacesaving bags. The necessary counterweight is obtained in the very moment where, in emergency, the bag is thrown overboard and is being filled with water.

In practice, it would be expedient if the bag has shape of a long hose, one end of which is open and secured to the connecting-line while the other end is fitted with a non-return valve allowing the water to pass into the hose but not out of this. This other end must furthermore be so heavy that it will be weighed down into the water when the hose is lowered sufficiently far down along the ship's side, whereby the water, via the non-return valve, will rise in the hose to the same level as exist in the water around the hose in the moment in question.

If the life-saving device should sink, in relation to the concurrent position of the hose, this will be pulled up by means of the line-connection between the life-saving device and the hose, whereby, in the hose, at a height above the level of the surface of the surrounding water there will be standing a column of water as then functions as the counterweight prober.

The flexible wall of the hose can in advance be distended by means of a number of stiff rings placed crosswise in the hose at regular intervals in the longitudinal direction of this. During storing the hose can be collapsed like a concertina to be automatically pulled out when the hose is thrown out from the ship's side. The hose then from the very first has a shape allowing it quickly to be filled with the necessary quantity of water when submerged below the surface of the water.

In some cases these stiffening rings can, however, be an obstacle to the vertical movements of the hose as they may be inclined to catch, for instance, a fender on the ship, when the hose, in the rough sea, skids up and down the ship's side. The hose could then be stuck, unable to fulfil it's purpose, or it can be torn into pieces causing the water in the water column to run out and the hose to lose it's weight.

In order to avoid these disadvantages the hose can instead be smooth along it's entire length, in which case, it furthermore can be coiled like a carpet, when flattened.

It is desirable, that the hose quickly fills with water, when it is thrown into the sea. This filling could take more time when the hose beforehand is flattened than if is already is distended with stiffening rings.

A flattened hose will, however, open itself more quickly if it's flexible wall is internally coated with an elastic foam plastic or foam rubber, which in unloaded condition has a shape of a cylinder. As soon as the flattened, possibly coiled hose, is uncoiled, the elastic foam lining on the inside of the wall of the hose will namely return to it's originally tubular form whereby the hose is distended.

If the foam material furthermore has an open cell structure, it will be absorbent and absorb water itself, which thereby will be part of the total counterweight. This part functions independent of the height of the water column which constitutes the main part of the total weight of the hose above the water level. The construction is therefore very reliable, as there, dependent of the thickness of the foam lining, always will be a certain amount of counterweight, even if the non-return valve fails or the bag is torn into pieces causing the column of water to run out.

In some cases, it may be expedient to replace the hose entirely with a block or a rod of foam plastic or foam rubber, which in that case could be reinforced with wire strands for taking the load of the water contents which the foam material would have absorbed. This construction is exceptionally reliable, since it does not contain any mechanical parts that could fail or be damaged. The effect is achieved exclusively

by means of the water absorbing qualities of the material. Furthermore, the foam material is soft and accommodating so that persons, struggling in a rough sea around the counterweight, will not be injured even if they are hit by the counterweight during the heavy movements of this or if they are themselves thrown against the counterweight.

At the initial phase of a rescue operation the life-saving device and the bag are thrown overboard, being attached to either ends of the connecting-line. If the life-saving device is e.g. an inflatable platform it will now be blown up automatically, and the bag will at the same time sink towards the bottom and is being filled with water.

The life-saving equipment then could advantageously comprise a winch for, by means of the connecting-line, hauling the platform into the ship's side and pull the bag, now filled, somewhat up from the water, whereby the column of water in the bag above the surrounding water surface will act as a counterweight.

In some cases it would be desirable if the vertical movements of the counterweight were smaller than those of the life-saving device. This is rendered possible by inserting a gearing in the connecting-line. Such a gearing will cause the movement of the counterweight to be damped in proportion to the movements of the life-saving device.

In other cases, a gearing could be inserted in the connecting-line, which would, conversely, double the vertical movements of the counterweight in proportion to those of the life-saving device. The components of the counterweight, e.g. the bag or the hose, must be dimensioned proportionally smaller.

The invention will be explained more fully by the following description of embodiments, which just serves as examples, with reference to the drawing, where

Fig. 1 shows schematically a life-saving device according to the invention used in connection with an inflatable evacuation platform and a stocking-like escape chute,

Fig. 2 shows the same, but in a smaller scale and with a double equipment,

Fig. 3 shows a life-saving equipment according to the invention used in connection with a life-saving platform and an escape chute

Fig. 4 shows a life-saving equipment according to the invention used in connection with a very big inflatable life raft which, at the same time, functions as a platform, and a stocking-like escape hose,

Fig. 5 shows the same, but with an escape chute instead of an escape hose,

Fig. 6 a, b, and c show schematically successive stages of the vertical movements which a life-saving platform and a counterweight bag carry out in rough sea, moving in counter phase in relation to each other,

Fig. 7 a and c show the same but in phase in relation to each other,

Fig. 8 a and c show schematically successive stages of the vertical movements which a life-saving platform and a counterweight bag carry out in rough sea, moving in counter phase in relation to each other, and where a gearing in the connecting-line between the platform and the bag has been

inserted, which halves the vertical movements of the counterweight in proportion to those of the platform,

Fig. 9 a and c show the same, but with a gearing which doubles the vertical movements of the bag in proportion to those of the platform,

Fig. 10 shows a first embodiment for a counterweight for the life-saving equipment according to the invention,

Fig. 11 shows a non-return valve for the counterweight shown in fig. 10,

Fig. 12 shows another embodiment for a non-return valve for the counterweight shown in fig. 10,

Fig. 13 shows a cross-section, in perspective view, of a second embodiment for a counterweight for the life-saving equipment according to the invention,

Fig. 14 shows fragmentarily, in perspective, a third embodiment for a counterweight for the life-saving equipment according to the invention, and

Fig. 15 shows fragmentarily, in perspective, a fourth embodiment for a counterweight for the life-saving equipment according to the invention.

In fig. 1 is very schematically shown a ship 1, which is in a rescue situation, where a life-saving equipment, generally designated by the reference number 2, has been brought into position along the ship's side 3.

In the water is floating an inflated rubber platform 4 and next to this an inflated rubber life raft 5. From a cassette 6 on the ship 1 a stocking-like hose or a chute 7 is led down to

the platform 4. Persons, who are to be evacuated from the ship can now get down onto the platform by skidding down through the chute. From the platform they can come then onboard the life raft.

In order to make this operation to succeed with adequate reliability, the platform must be held close to the ship's side. If the platform is drifted by the normally heavy sea, in such situations, away from the ship's side there is a risk that the platform loses the connection with the chute whereby the rescue operation will be made difficult or fails. In the worst case, the persons who are to be rescued, could end up in the water where they run the risk of drowning.

It is therefore necessary to hold the platform close to the ship's side for the duration of the rescue operation. This takes place, in this case, by means of two lines 8a,b, as via two eyelets 9a,b on the ship's side are led up over two fix pulleys 10a,b on the ship.

Moreover, a winch 11 is fitted to the ship for, by winding up a line 13, to tighten the lines 8a,b for thereby hauling the platform into the ship's side.

The line 13 is first running around a fixed pulley 14 and then around a horizontally movable pulley 15 and finishes in having the end fixed to a second horizontally movable pulley 16 around which the two platform lines 8a,b are running.

Along the ship's side a counterweight in the shape of a long bag 17 is hanged out, in which there is a column of water 18 The bag is hanging in a line 19, which over a fix pulley 20 is running to the movable pulley 15 to which it is connected with the end. When the winch line 13 is wounded up in order to haul the platform close to the ship's side, the water-filled bag 17

will at the same time be hoisted up along the ship's side to a appropriate level.

The weight of the water column 18 in the bag 17 now is transferred through the connecting-line, consisting of the bag line 19, the winch line 13 and the platform lines 8a,b, causing the resulting pull in the platform 4, which acts opposite to the gravitation, to be half the weight of the water column 18. This is caused by the fact that a gearing ratio of 1:2 is created by having the winch line 13 to run to and fro over the movable pulley 15, to which the end of the bag line 19 is attached, before the winch line 13 with the end via the second movable pulley 16 transfers the pull to the platform lines 8a,b. The gearing ratio causes correspondingly the vertical movements of the platform in high sea to be double the size of the corresponding movements of the bag.

As can be seen, the water-filled bag will in this way make an efficient counterweight for the platform.

In practice, the bag arrangement is dimensioned in such a way that the upward directed pull in the platform always will be smaller than the weight of the platform. The counterweight will, therefore, not be able to pull the platform out of the water, but only carry out the very important object of securing the platform lines 8a,b to be hold in such a tightened condition that the platform always during the rescue operation will be hold close against the ship's side.

How heavy the pull in the lines will be is depending on the size with which the counterweight is dimensioned and on the size of the gearing, if any, in the line connection. At all events the counterweight will, however, be dimensioned in such a way that it is heavy enough to securely hold the platform into position along the ship's side, but not so heavy that any

of the lines are loaded so much that there may be a risk for them to snap.

Under normal conditions the different parts of the life-saving equipment will be stored in a compact shape on the ship, in e.g. containers with all the line connections in place or ready to be quickly brought into place, when the equipment is to be used.

If the ship comes in emergency, where it is necessary to evacuate the persons onboard, the equipment will be thrown into the sea with slack lines. Immediately after the platform automatically starts to inflate while the bag is sinking, wholly or partly, down below the surface of the water. This process will take some minutes whereafter the lines will be tightened by means of the winch. The platform is thereby hauled into the ship's side and the bag is hoisted up along the ship's side until the water column 18 is sufficiently high to impart the platform lines 8a,b the necessary pre-tension for constantly holding the platform in the wanted position close against the ship's side.

The life-saving equipment can, within the scope of the invention, be configured and used in many different ways in connection with rescue and evacuation of persons from a ship in distress.

As examples of this can, in addition to the construction shown in fig. 1 and described above, be mentioned the constructions shown in fig. 2 - 5, where the same parts have the same reference number.

The construction shown in fig. 2 is similar to the one shown in fig.1, but with the difference that there is no gearing and that there now is mounted a counterweight bag with belonging connecting-line on each side of the platform. Each bag can

advantageously be dimensioned with relatively smaller dimensions, and furthermore the reliability of the equipment will be increased, because the equipment is not completely put out of function, even if it should fail in one of the sides.

In fig. 3 the life-saving equipment also is used in connection with a life-saving platform, but instead of a chute a skid 21 has been used, on which the persons who are to be rescued can skid down in order to get down onto the platform. In this case there is only one counterweight and one single platform line 8, which is led down to the centre area of the platform where it is fixed to the bottom of the platform.

In fig. 4 the life-saving equipment can be seen used for holding a very large, combined life-saving platform and fleet 22 close into the ship's side. Persons, who are to be rescued, can through the chute 7 skid down onto the combined platform and fleet, which, as is the case in the construction shown in fig. 2, is hold against the ship's side by a counterweight bag having connecting lines on each side of the combined platform and fleet.

The life-saving equipment shown in fig. 5 is similar to the one shown in fig. 4 with the difference that the large, combined life-saving platform and fleet now is hold close against the ship's side by only one counterweight bag having a connecting-line, and that the evacuation takes place via a chute 21.

In fig. 6 - 9 it can be seen how a life-saving equipment in different configurations will operate in various types of wave motion when a bag is used as a counterweight. In all cases it is assumed that the bag is filled solely by the passage of the waves. In practice, in the initial phase of the rescue action, the filling degree will normally be greater as the bag is thrown into the sea in a slack line, as earlier described, and

is then hoisted up along the ship's side until the column of water above the surface level in the surrounding water has reached the desired height.

In fig. 6a, b and c the platform 4 and the bag 17 are moving vertically up and down in counter phase. The gearing ratio in the connecting-line is 1:1. In fig. 6a the platform is in a trough of the waves, while the bag is in a wave crest. Thereby the bag is filled, according to the above mentioned assumptions, to the same height as the surrounding water surface in the wave crest.

In fig. 6b the platform is raised by the following wave, while the bag is sinking into the following trough of the waves. Since the gearing ratio is 1:1, the two vertical movements are exactly equal, and the height of the water column in the bag will therefore be unchanged. The water in the bag will therefore maintain the same height as the surrounding water in the wave.

The same is the case in the situation shown in fig. 6c. When the gearing ratio in the connecting-line is 1:1 and the platform and the bag consequently are moving vertically in counter phase in the wave motion, the bag can only be filled to a height above the level of the surrounding water and the function as a counterweight, if the bag, as mentioned earlier, first is thrown out in slack line and filled in advance, and then is hoisted up along the ship's side by means of the winch 11 to such a height that the water column in the bag is sufficiently large to impart the bag with the necessary counterweight.

Fig. 7a and b show the same configuration, but now with the platform 4 and the bag 17 in phase in the wave motion.

In fig. 7a both the platform and the bag are on a wave crest. The bag has been filled with water to the same height as the surrounding water surface in the wave crest.

In fig. 7b both are in a trough of the waves. Since the gearing in the connecting-line is 1:1 the bag is raised just as much as the platform is lowered, in other words, a distance equal to the height of a wave. The water surface around the bag has at the same time sunk equally, and consequently there is a water column 18 with a height twice the height of a wave above the water level in the trough of the waves.

With this configuration there will be no counterweight in the situation shown in fig. 7a, but a very large counterweight in the one shown in fig. 7b. In the drawing the waves are sinusoidal but in practice they can vary widely from this.

The downward movement of the platform shown in fig. 7a to 7b can therefore sometimes be almost a free-fall, whereby the line 8, when the conventional systems are used, can be exposed to such great stress, that it breaks. This is avoided by means of the counterweight, which willingly gives in for the pull in the connecting-line and at the same time the size of the counterweight will rapidly increase, thereby dampening the consequences of the free-fall.

Fig. 8a and b show the same configuration as shown in fig. 6a, b and c. The platform 4 and the bag 17 are moving vertically in counter phase in the wave motion, but there is now inserted a gearing with a ratio of 2:1 in the connecting-line, and that means that the vertical movements of the platform are twice as big as those of the bag.

In fig. 8a the platform is in a wave trough, while the bag is on a wave crest and has been filled with water to the same level as this wave crest.

When the situation changes to that shown in fig. 8b, the platform has been raised the height of a wave while the bag now only has been lowered one half of the height of a wave due to the presence of the gearing in the connecting-line.

As it can been seen, there now is standing a water column having half the height of a wave above the water surface. In this case there will consequently, contrary to the case shown in fig. 6a,b and c without gearing, exist a water column above the level of the surrounding water, except just in that moment when the platform is in a wave trough and the bag on a wave crest.

When the gearing in the connecting-line is 2:1, as shown in fig. 8a, and b, a more steady up- and downwards vertical movement of the bag is obtained than is the case as previously mentioned with a gearing of 1:1. On the other hand, the bag must have twice as big dimensions.

In fig. 9a and b the situation is reverse. The gearing ratio in the connecting-line is 1:2 and that means that the bag is raised and lowered twice as much as the platform and can be used with correspondingly smaller dimensions, that means half the size of the bags shown in fig. 6 a, b and c. and fig. 7a and b, and a quarter the size of the bag shown in fig. 8a and 8b.

In fig. 9a the platform 4 and the bag 17 are both in a wave trough. The water in the bag is at the same height as the water surface in the wave trough.

In fig. 9b both of them are on a wave crest and the water column in the bag has a height of three times the height of a wave. The variation in effective height of the column in the

counterweight is therefore greater than is the case in the other examples mentioned above.

Fig. 10 shows a first embodiment of a counterweight 17 for a life-saving equipment according to the invention.

The bag 17 has the shape of a long hose with a wall 24 made of a flexible material, for example canvas or plastic. At the top the bag is open and fitted with straps 26 for hanging up the bag. At the bottom the bag has furthermore a non-return valve 23 which allows water to stream into but not out of the bag. The bag is furthermore distended by rings 25, which for example can be made of stainless steel such as wires that have the sufficient rigidity effect, but yet are able to yield without being damaged, if the bag should hit the ship's side.

The non-return valve, which is best to be seen from fig. 11, comprises a bottom grating 27 which is fitted into a valve housing 30 to the flexible wall 24 of the bag. Upon the bottom grating is fitted a flexible membrane which can, for example, be made of rubber, and which is retained at it's centre by a supporting disc 29.

The grating is sufficiently heavy to pull at least the lower end of the bag into the water when, in an emergency, the bag is thrown overboard in a slack line. The water then will flow into the bag in the direction indicated by the arrows. When the bag is hoisted by tautening the lines by means of the winch on the ship, the water will, however, remain in the bag, as the membrane now, by the weight of the water, is forced tightly to abut the upper side of the grating.

Fig.12 shows an alternative embodiment for a non-return valve for a counterweight. In this case a number of openings 31 are formed at the bottom of flexible wall 24 of the bag, while the bag else is closed at the bottom. On the inner side of the

flexible wall 24 of the bag, at the openings 31, is fitted a pendent skirt 32 which along the periphery is fixed to the flexible wall at an area above the openings.

When the bag in the initial phase of a rescue action is thrown into the water in a slack line, at least the bottom end of the bag is forced into the water by a weight 33. Thereby water streams into the bag in the direction of the arrows, via the openings 31. When the lines are tautened by means of the winch, and the bag is hoisted along the ship's side, the water will remain in the bag, since the water pressure over the skirt 32 will force this to tightly abut the flexible wall 24.

In fig.13 can be seen another embodiment 33 for a bag for a life-saving equipment according to the invention. In this case there are no stiffening rings, and the bag can therefore conveniently be coiled like a carpet with the flexible walls 24 flattened out. This coiling can, for example, take place around a heavy rod 25 made of, for example, stainless steel which at the same time will function as a weight for pulling the lower end of the bag into the water in the initial phase of a rescue action. This construction has the advantage that it is smooth at the outer side and therefore not inclined to stick to protrusions on the ship's side, such as the fenders of the ship.

The above mentioned construction with a flattened, flexible wall will be filled more slowly with water than the construction with the stiffening rings, being open in it's total length from the start.

The construction shown in fig.14 for a bag for a life-saving equipment according to the invention has, as in the previously mentioned embodiments, a flexible wall 37 made of canvas or plastic. But now the wall has furthermore an inner coating 38

of elastic foam material such as foam rubber or foam plastic, which in unloaded condition has a tubular shape.

This construction can also be coiled like a carpet around a heavy rod 39, and thus it takes up very little space, since the foam material can be compressed to a very small volume.

But when the bag is thrown into the sea and is uncoiled, it will, however, immediately open itself as the now unloaded foam material again will seek to return to it's original cylindrical shape.

When the foam material furthermore has an open cell structure, it will work like a water absorbing sponge. Thereby a double securing of the system is obtained. Even if the bag itself should leak, it will still be loaded with water as the foam material has absorbed and will therefore continue to function in tightening the platform lines such that the platform is hold close against the ship's side.

Alternatively, the bag can alone consist of a foam material with cast in reinforcing strands, or the counterweight can, as shown in fig.15, have the shape of a long rod 40, in cross-section for example rectangular with cast in reinforcing strands 41 for transferring the load from a water-drenched foam material to the straps 26.

This construction can also be coiled like a carpet around a heavy rod 42 for the purpose of pulling it's end down under the surface of the water.

Above, the counterweight is described as a single unit, for example a bag. A counterweight can, however, advantageously in some cases be made up of two or more bags in one bunch. Thereby a greater reliability will be obtained as the effect of the counterweight essentially is maintained even if one

single bag should fail, for example leak. Another advantage of such an arrangement is that the bags can be manufactured in standard in a predetermined size, and that the counterweight necessary for a specific application then can be formed by using the appropriate number of standard bags as is corresponding to that weight.

C l a i m s

---

1. A life-saving for rescuing persons onboard a sinking ship, for example, and which comprises a floatable life-saving device, e.g. an inflatable platform for launching at the ship's side and taking up persons who are to be rescued, c h a r a c t e r i z e d in that the life-saving equipment also comprises a counterweight for at a distance from the life-saving device to be hanged out over the ship's side, and a line-connection extending between the life-saving device and the counterweight and which is led over at least one guide, e.g. a pulley on the ship.

2. A life-saving equipment according to claim 1, c h a r a c t e r i z e d in that the counterweight consists of a bag of water to be taken in when the bag is wholly or partly submerged into the sea.

3. A life-saving equipment according to claim 1 or 2, c h a r a c t e r i z e d in that the bag has an elongated shape and is fixed to the connecting-line at one end, and that it furthermore has such a weight and weight distribution, that the free end can be forced down below the surface of the water when the bag is hanged out over the ship's side, in an rescue situation.

4. A life-saving equipment according to claim 1,2 or 3, c h a r a c t e r i z e d in that the bag has the shape of a hose, the fixed end of which is open and free end is equiped with a non-return valve allowing the water to passing in but not out of the hose.

5. A life-saving equipment according to claim 4, c h a r a c t e r i z e d in that the wall of the hose is made of a flexible material, for example canvas or plastic.

6. A life-saving equipment according to claim 4, c h a r a c t e r i z e d in that the wall of the hose is made of a flexible material, for example canvas or plastic which is coated with a layer of water-absorbing, elastic material, such as foam plastic or foam rubber having an open cell structure.

7. A life-saving equipment according to claim 5, c h a r a c t e r i z e d in that a number of rings of a mainly stiff material are placed crosswise the hose at regular intervals in the longitudinal direction of this.

8. A life-saving equipment according to claim 1, c h a r a c t e r i z e d in that the counterweight is made of a water-absorbing material such as foam plastic or foam rubber having an open cell structure.

9. A life-saving equipment according to one or more of the claims 1- 8, c h a r a c t e r i z e d in that a gearing is inserted in the connecting-line for increasing or decreasing the mutual proportion between the changes in length, which those of the connecting-lines extending between the at least one guide on the ship and the counterweight and the life-saving device, respectively, are undergoing during a rescue operation.

10. A life-saving equipment according to one or more of the claims 1- 9, c h a r a c t e r i z e d in that it comprises a winch for changing the length of at least those of the connecting-lines extending between the at least one guide on the ship and the counterweight and the life-saving device, respectively.

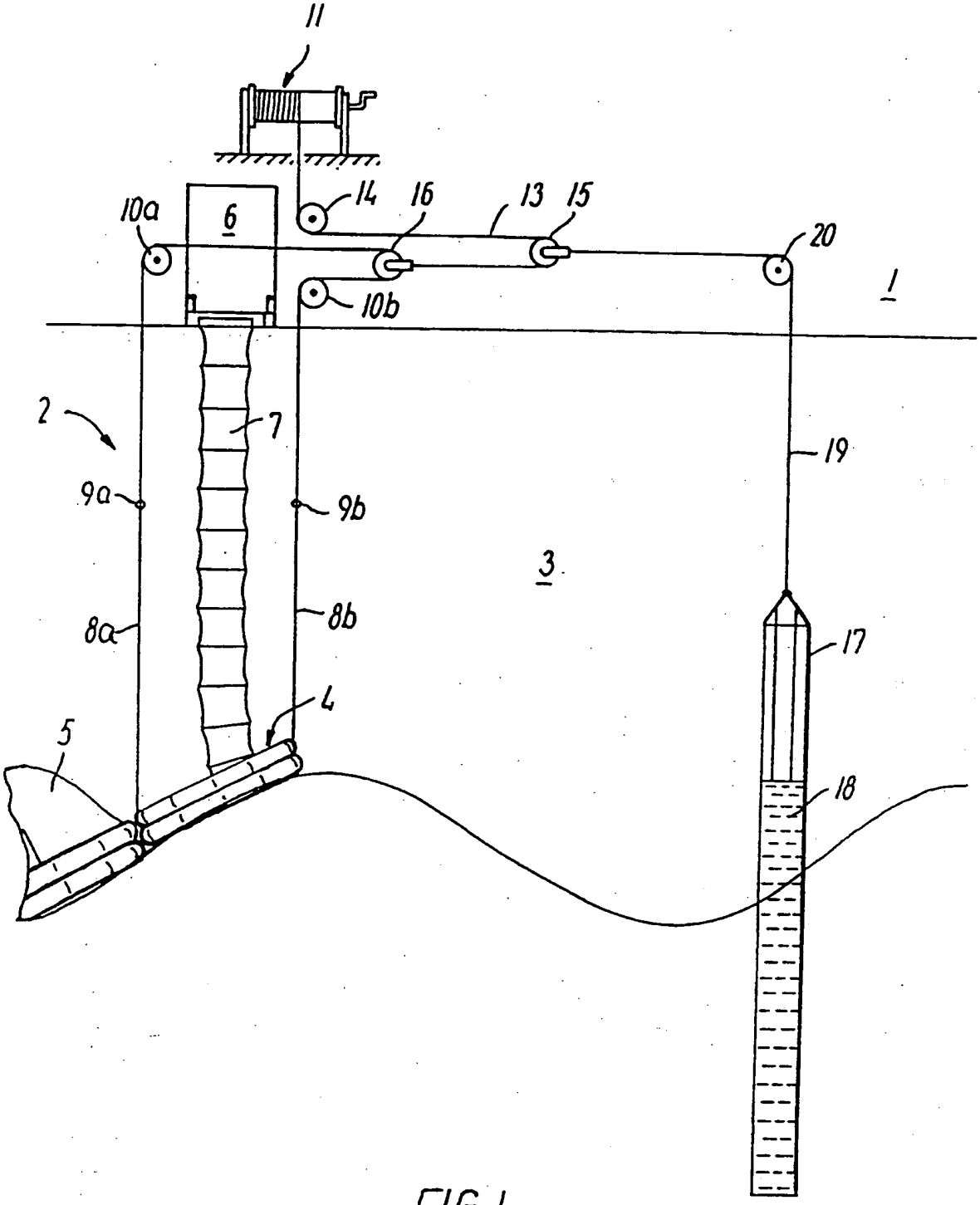


FIG. 1

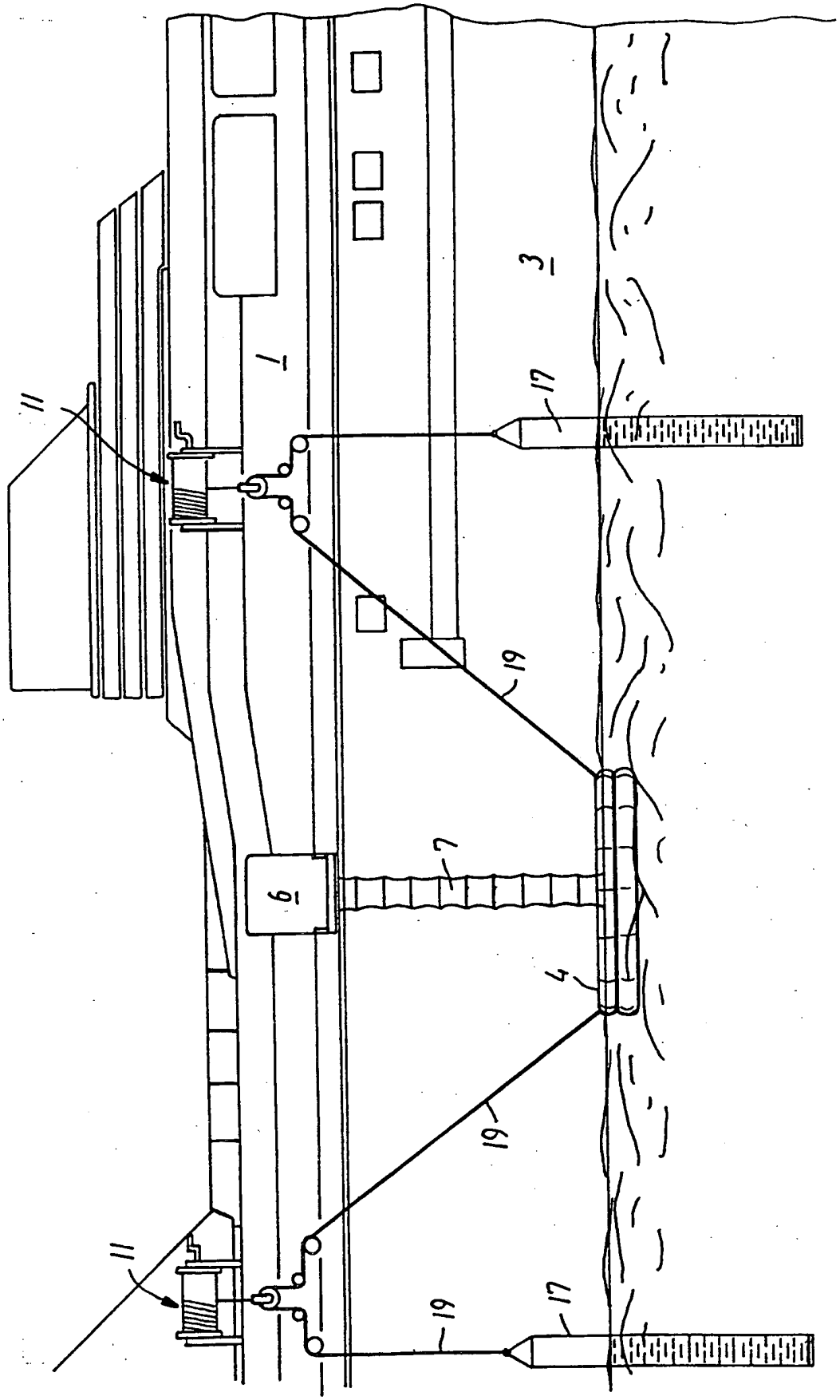


FIG.2

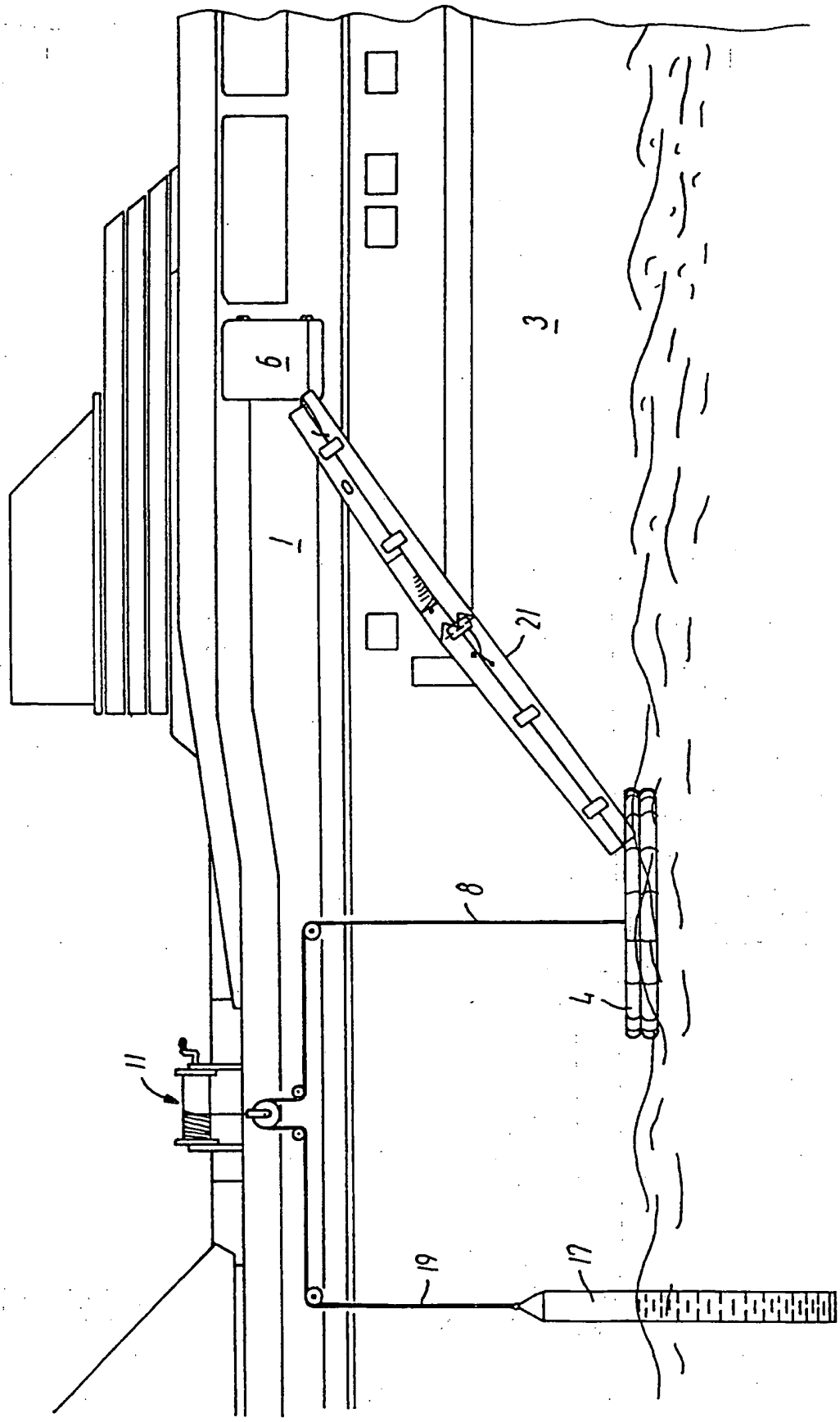


FIG.3

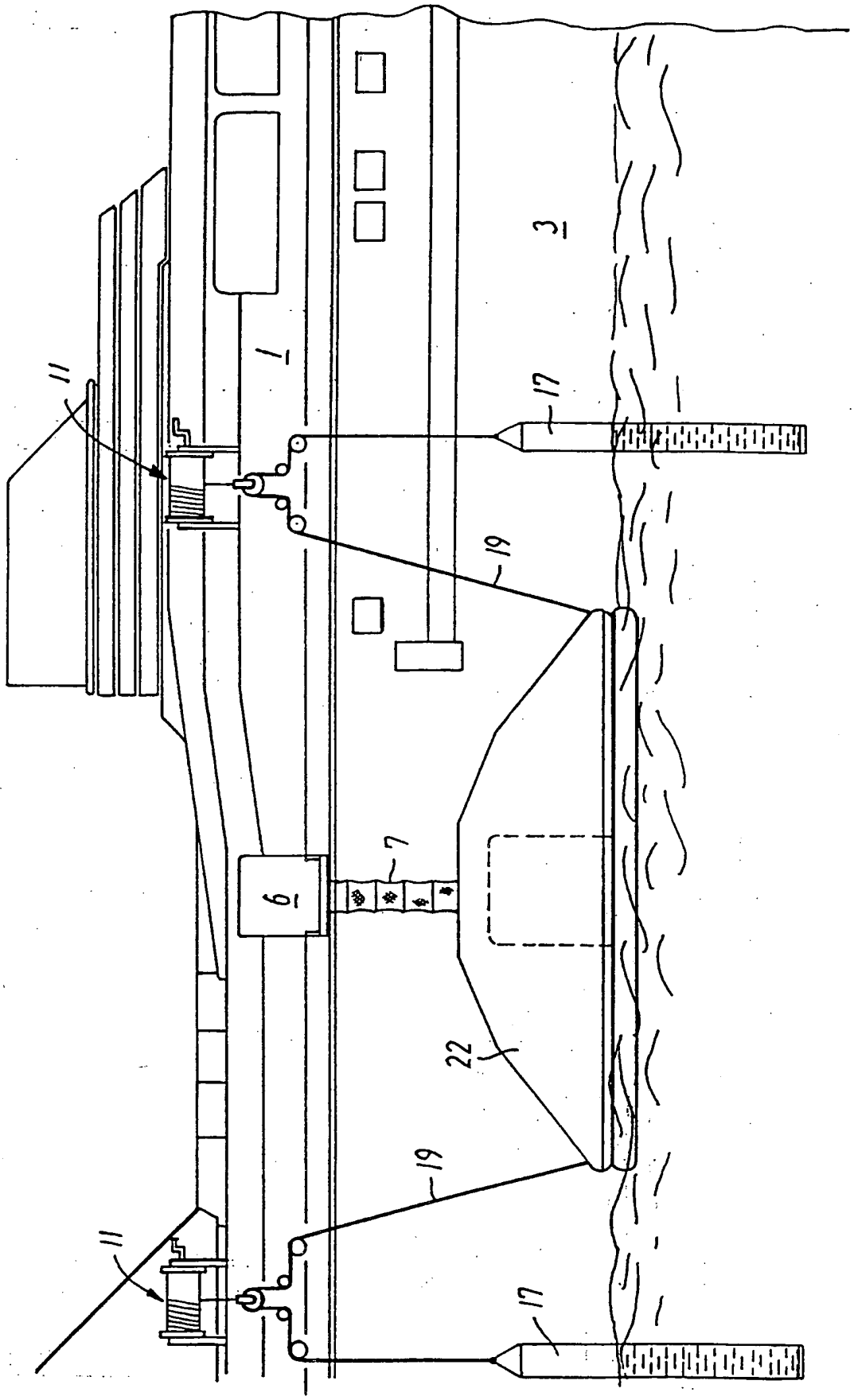


FIG.4

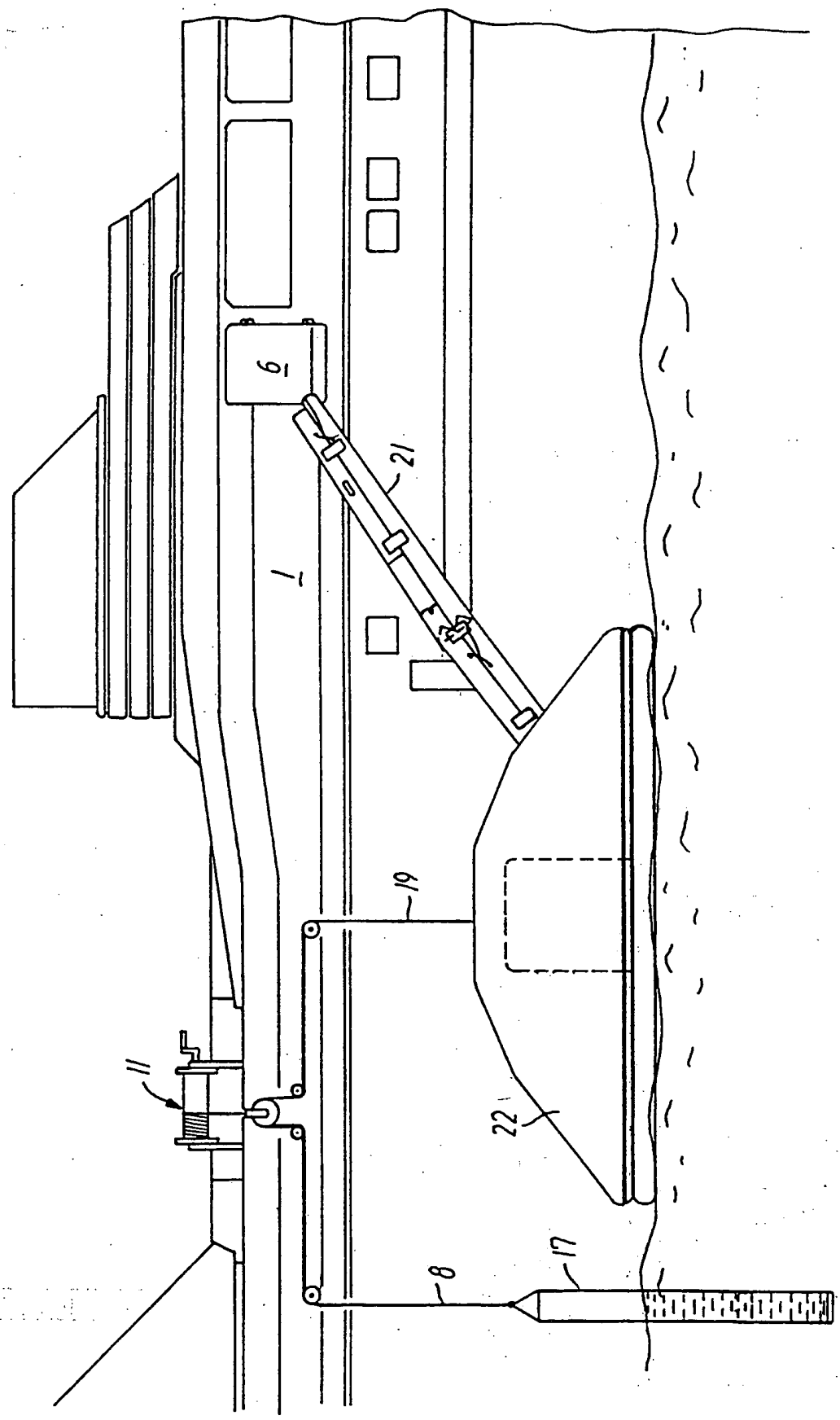


FIG. 5

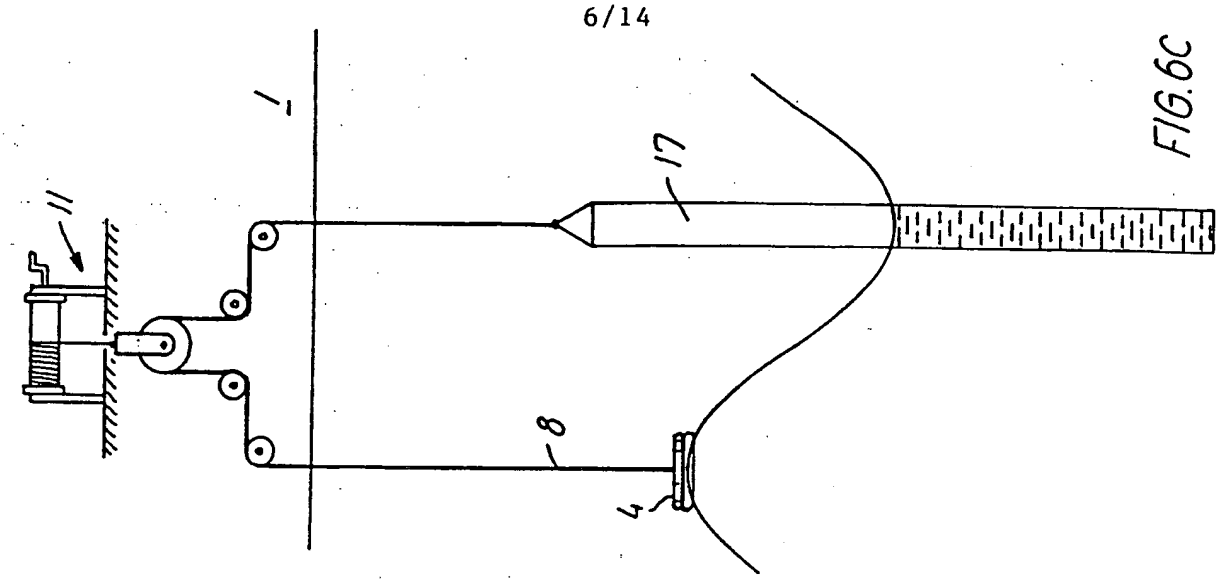


FIG.6c

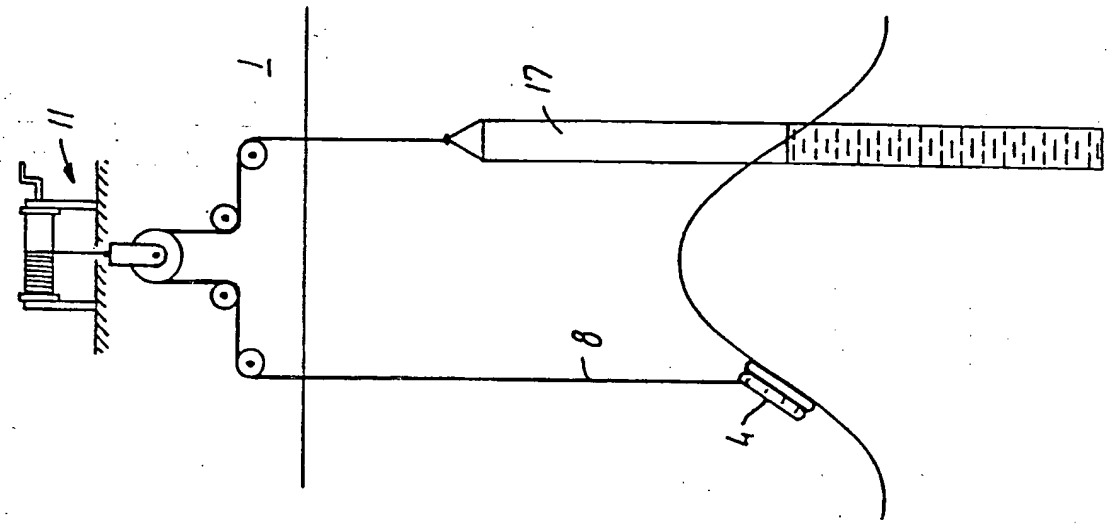


FIG.6b

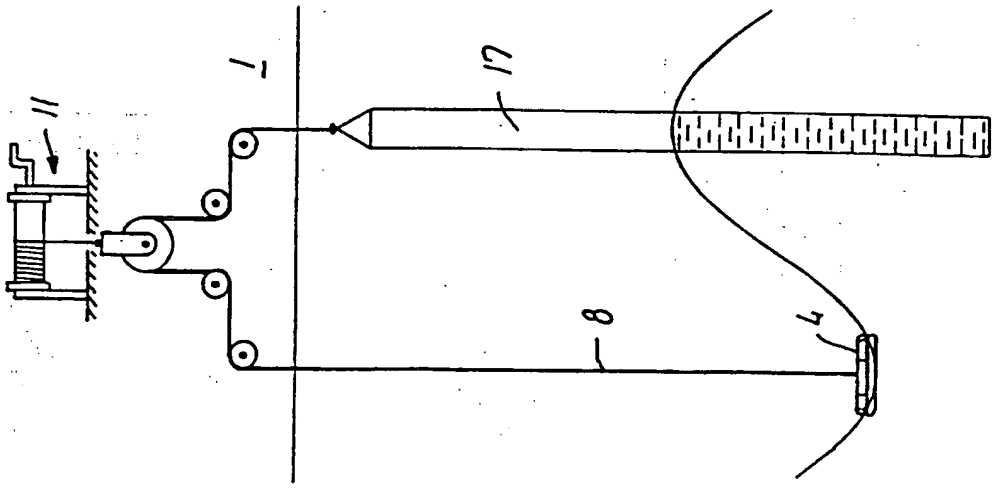


FIG.6a

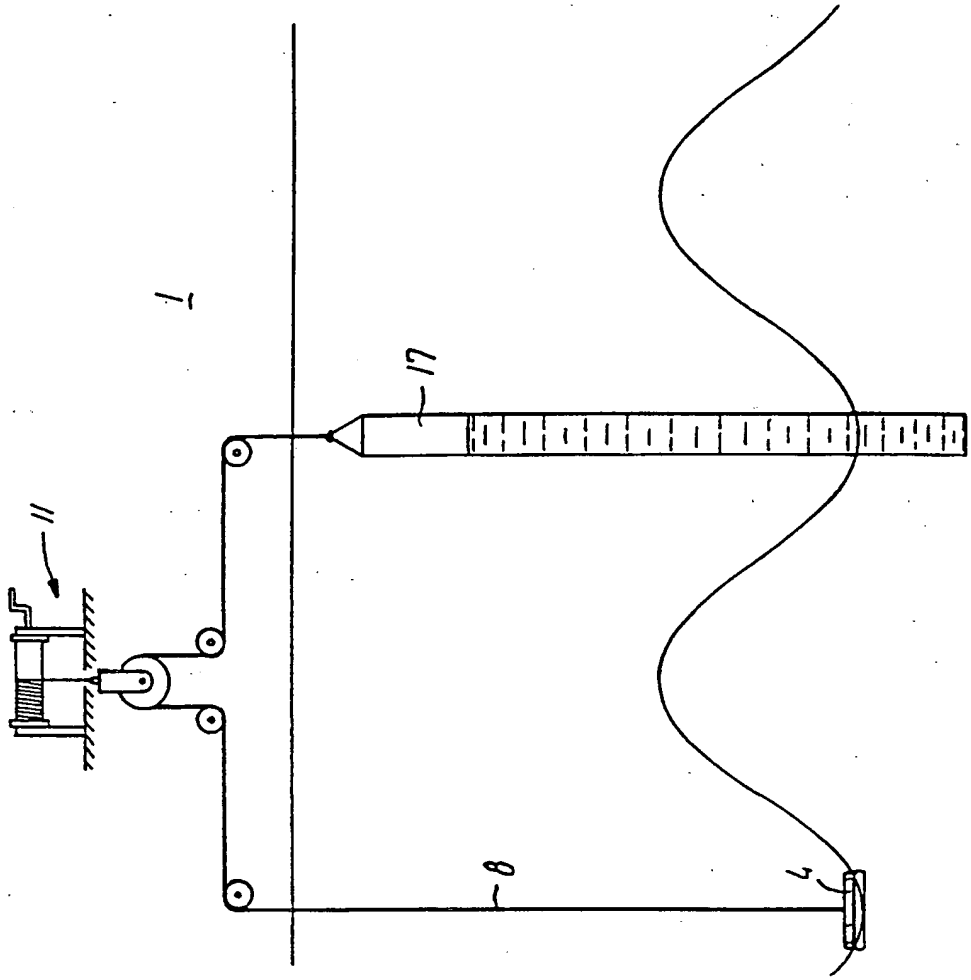


FIG. 7b

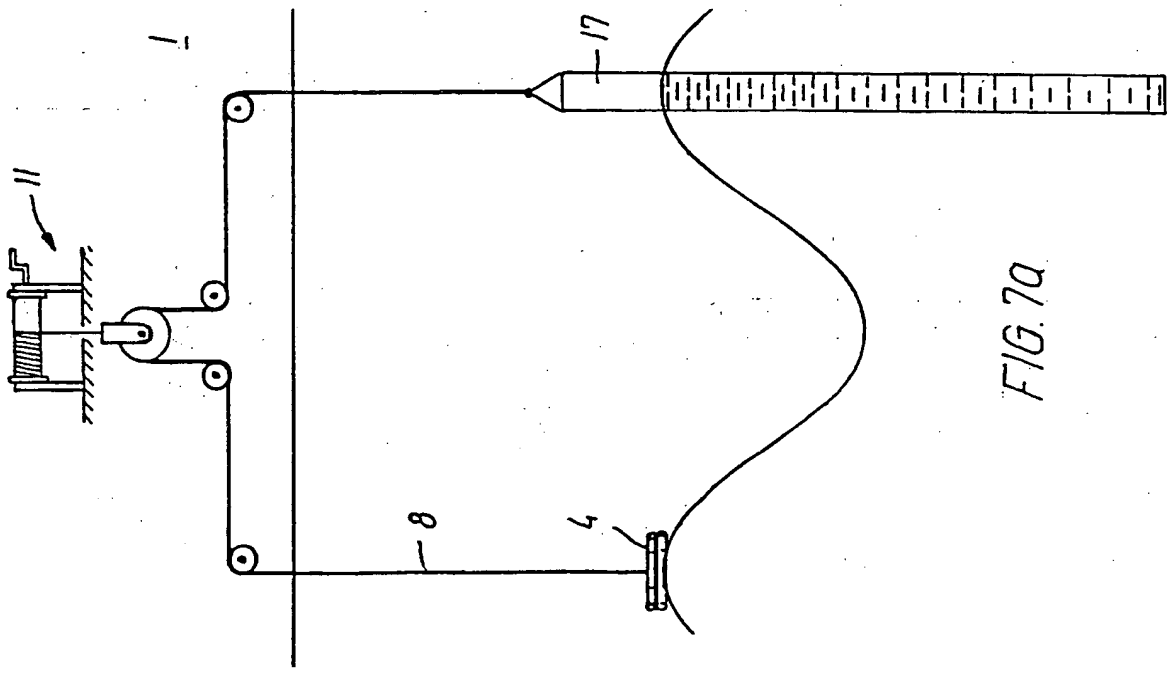


FIG. 7a

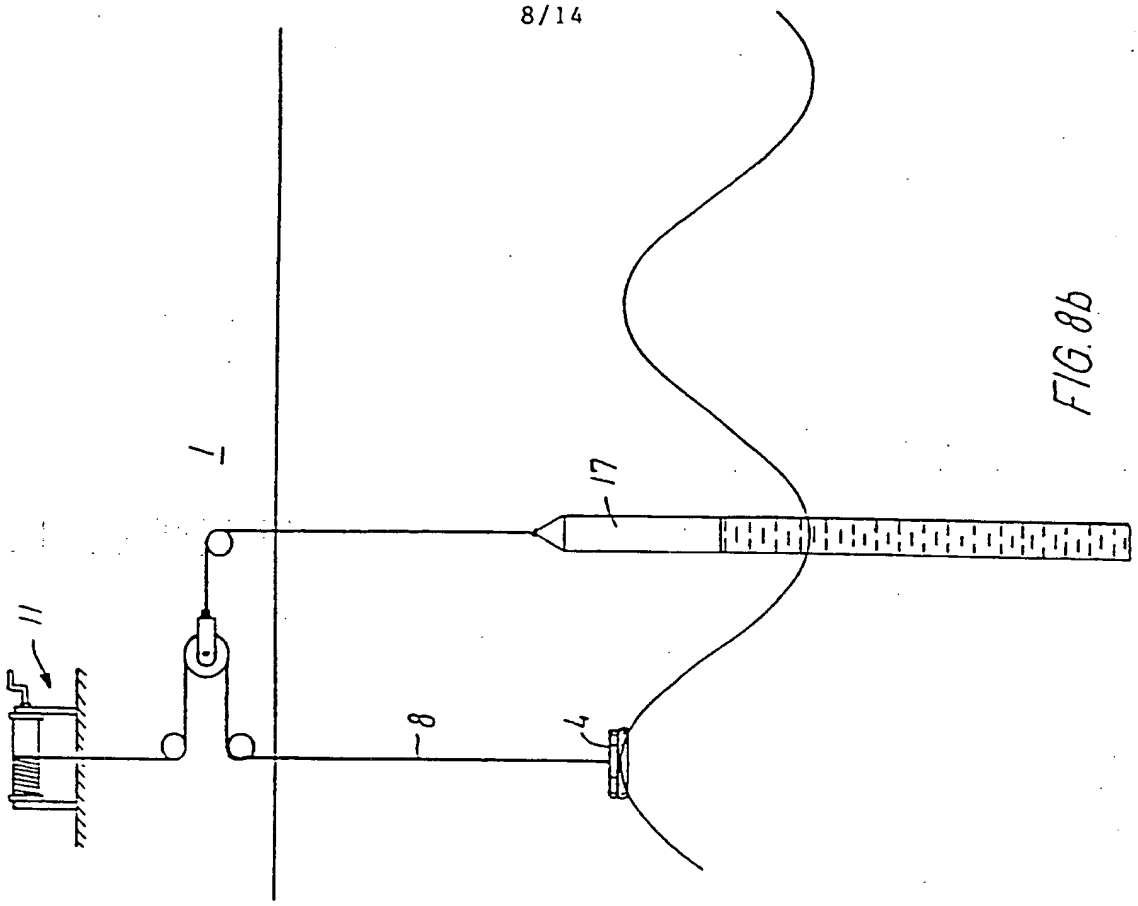


FIG. 8b

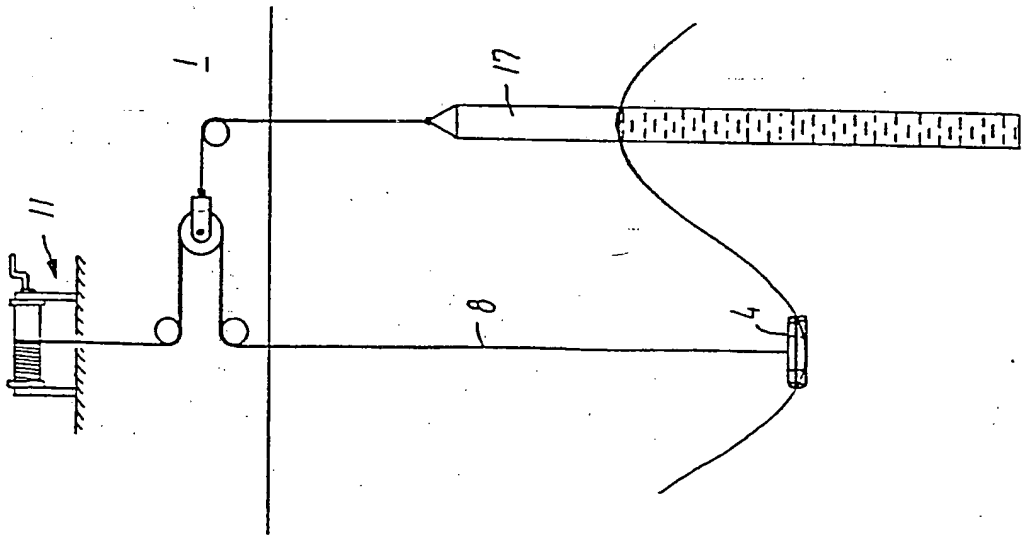


FIG. 8a

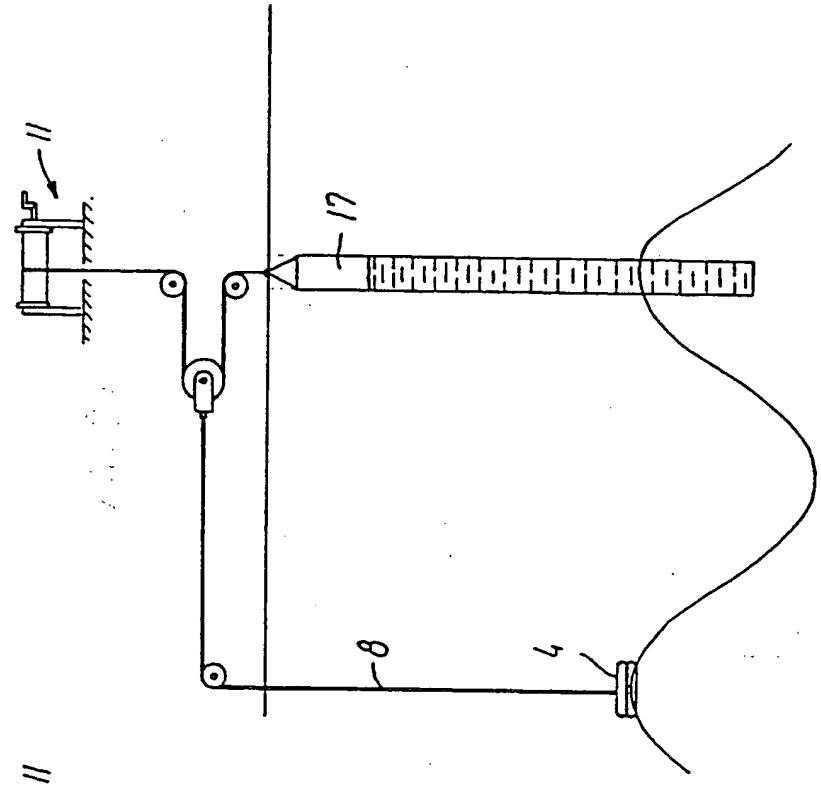


FIG. 9b

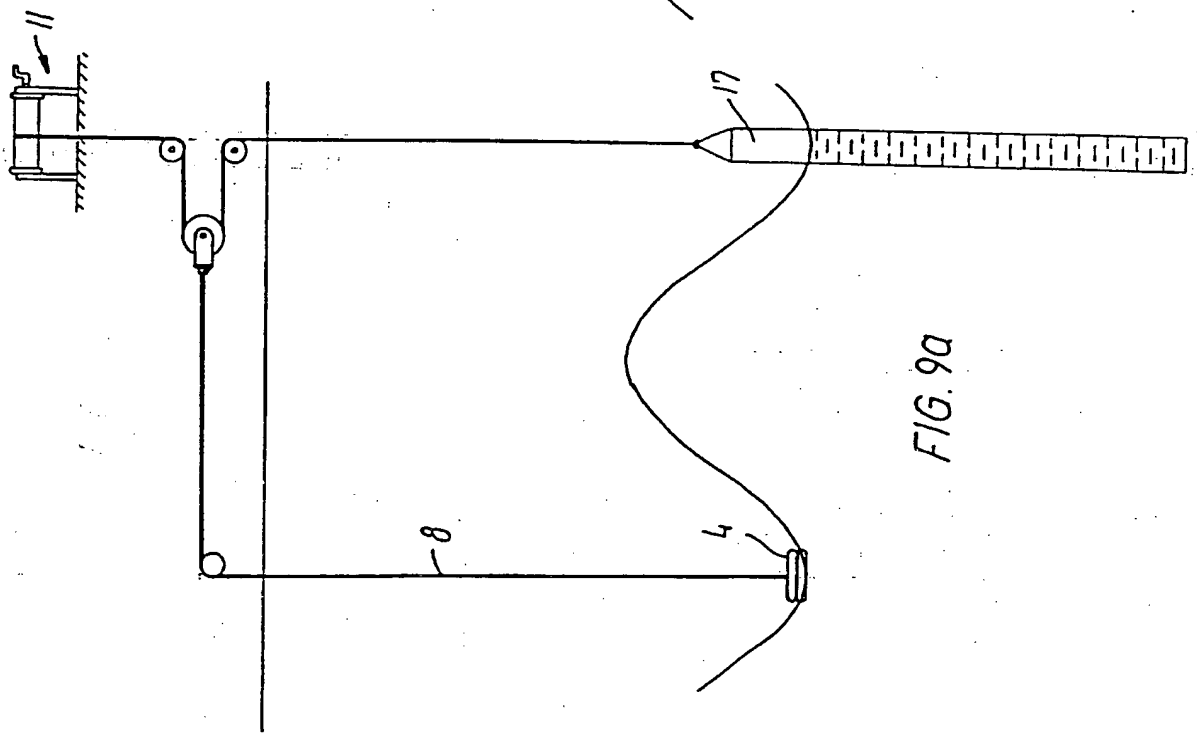


FIG. 9a

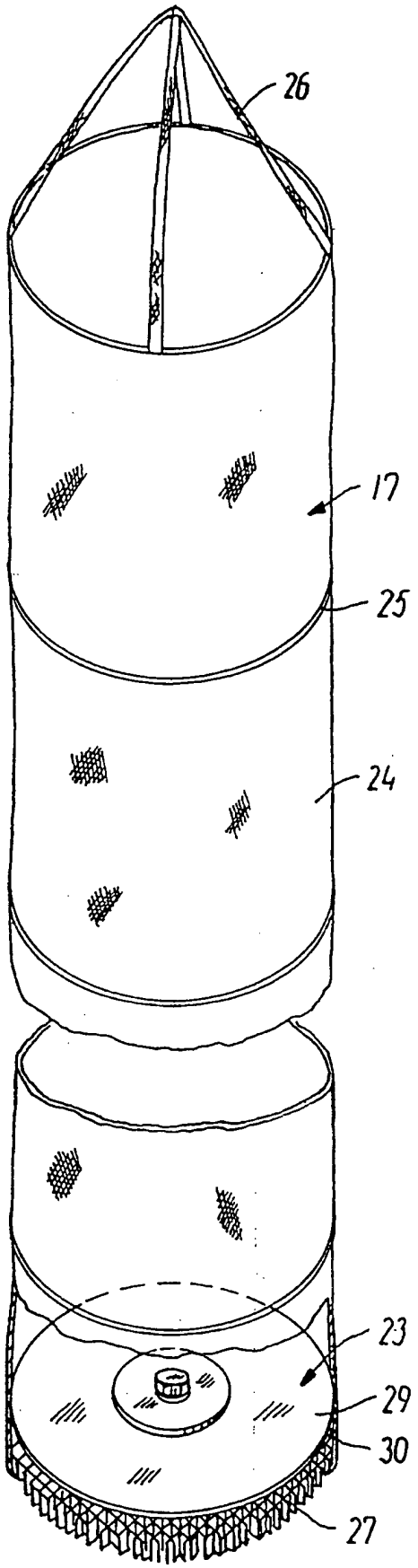


FIG. 10

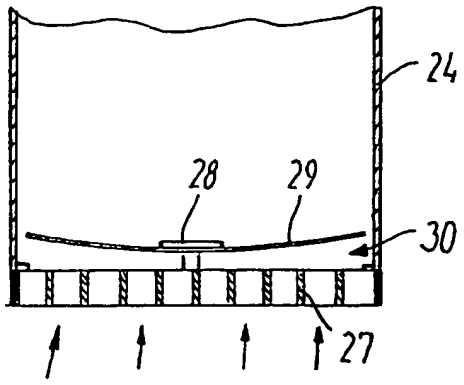


FIG. 11

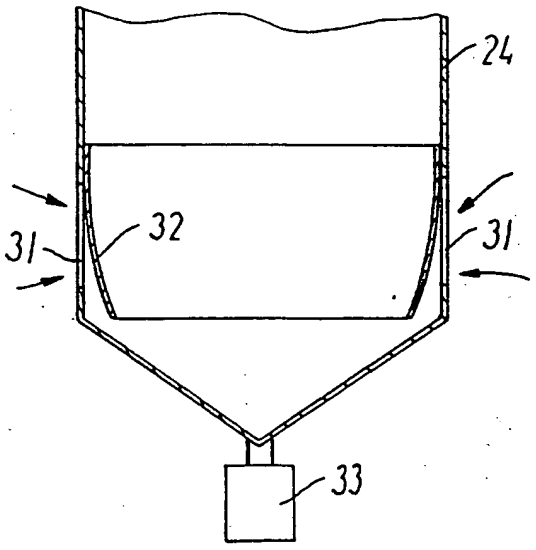


FIG. 12

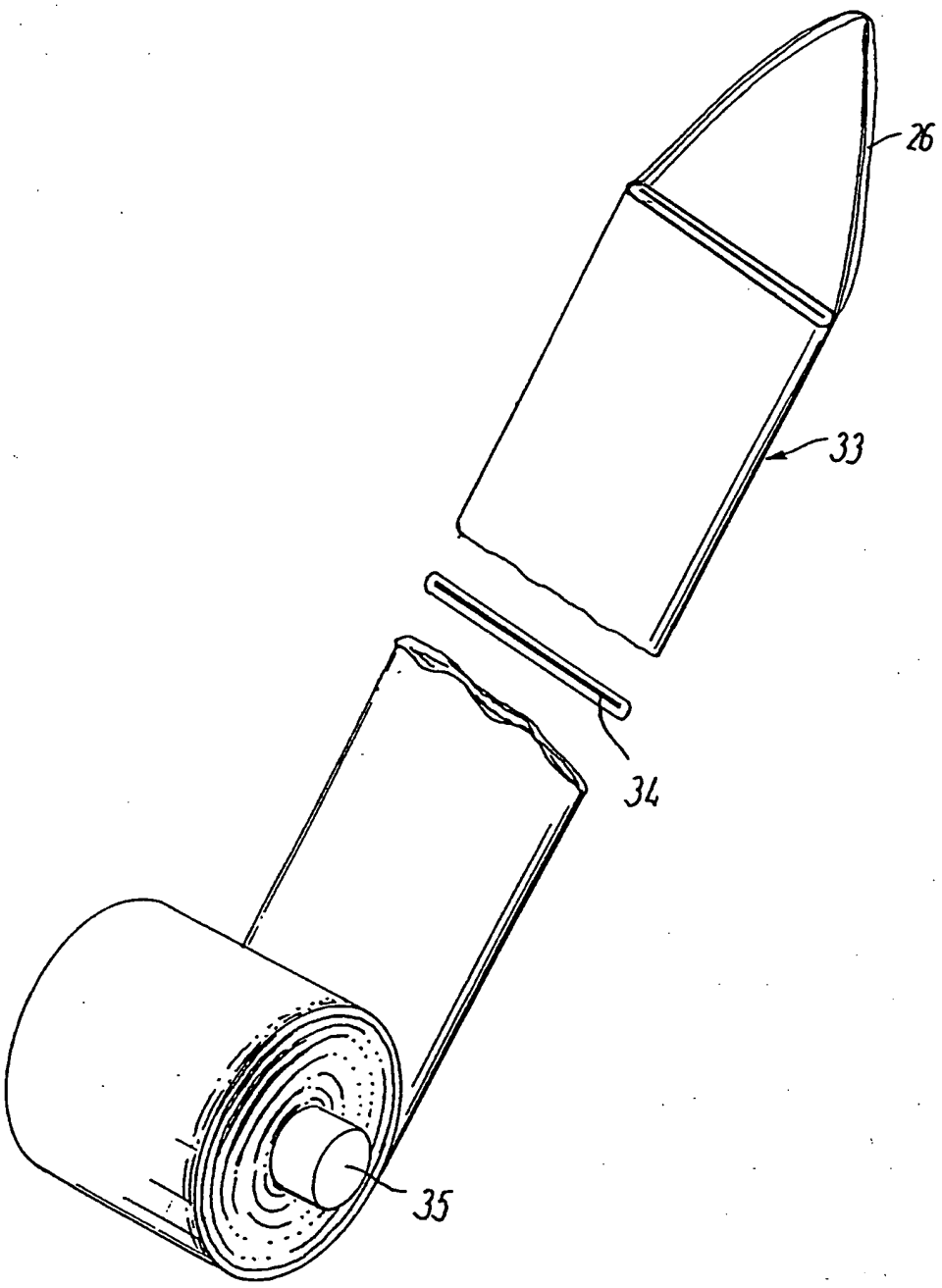
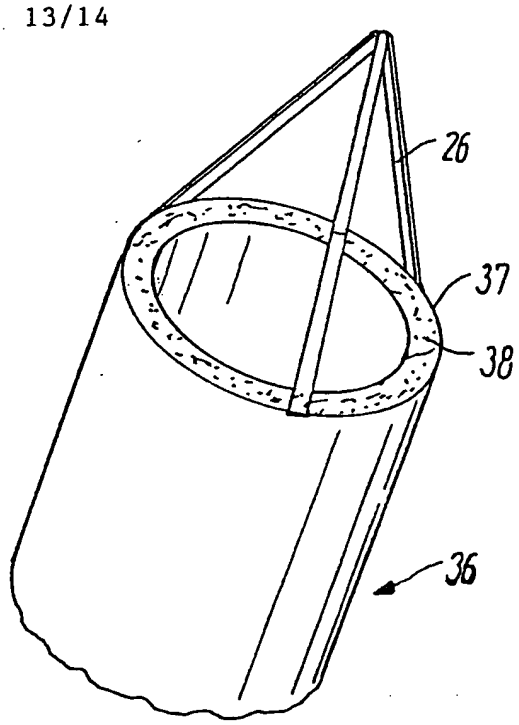


FIG. 13



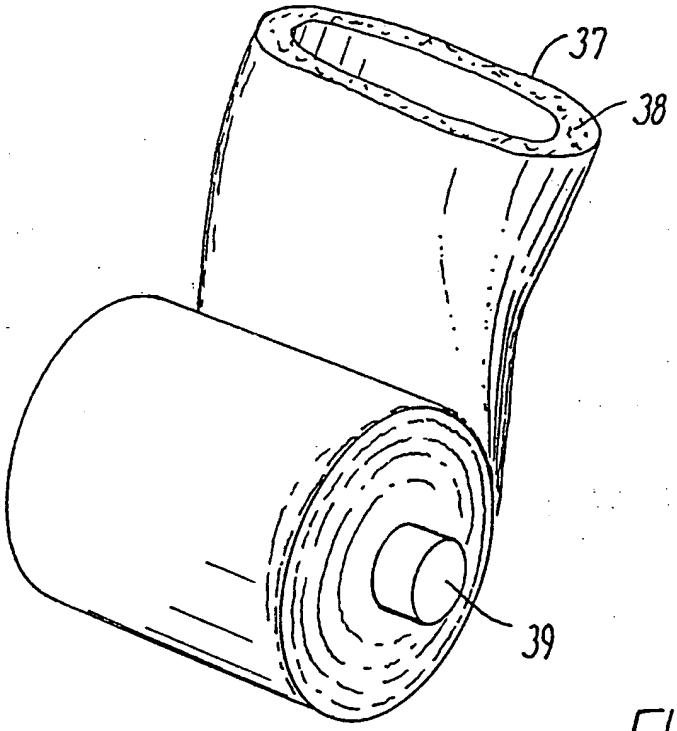


FIG. 14

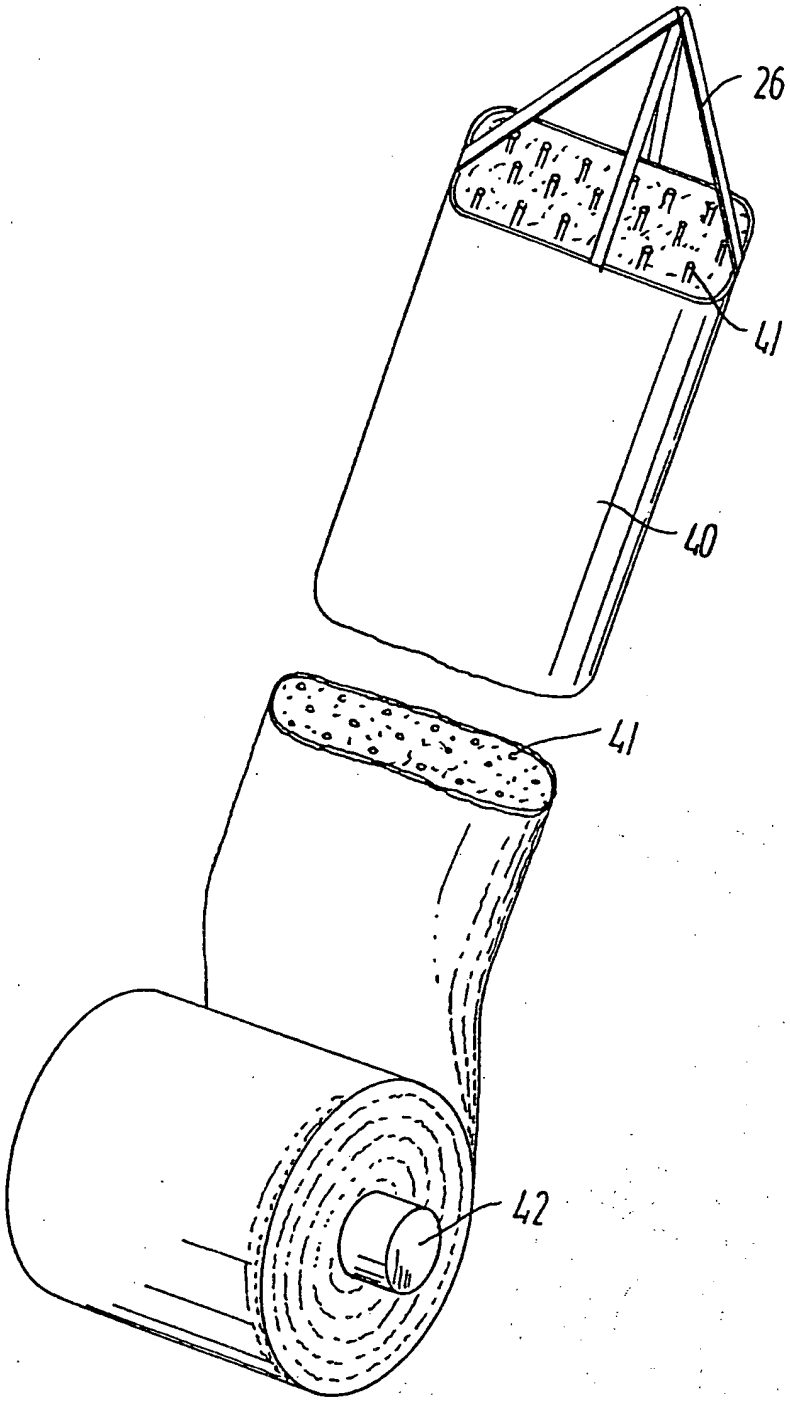


FIG.15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 95/00222

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B63C 9/22
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A62B, B63C, B63D, B64D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	NO 173369 B (SELANTIC INDUSTRIER AS), 11 June 1990 (11.06.90), figure 1, abstract --	1-10
A	WO 9401324 A1 (SELANTIC INDUSTRIER A/S), 20 January 1994 (20.01.94), figure 1, abstract --	1-10
A	DK 163725 B (A/S NORDISK GUMMIBÅDSFABRIK), 25 July 1991 (25.07.91), figure 3, abstract --	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 October 1995	12 -10- 1995
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Cecilia Jedlöv Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

Information on patent family members

28/08/95

Inte...ational application No.
PCT/DK 95/00222

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
NO-B- 173369	11/06/90	NONE	
WO-A1- 9401324	20/01/94	NONE	
DK-B- 163725	25/07/91	NONE	